

BERMANN, (I)

THE BACILLUS LEPRÆ

BY

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BALTIMORE, MD.

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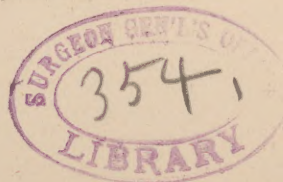
BALTIMORE, MD.

I N May, 1881, my friend Dr. I. E. Atkinson asked me if I would like to confirm, by microscopical examination, his clinical diagnosis of leprosy on one of his patients who had consented to have a piece of skin excised for that purpose. Our object was to see whether the discovery made by Hansen, Klebs, Eklund, Neisser, etc., as to the existence of the bacillus lepræ, would be verified by us, and thereby prove beyond doubt the existence of a solitary case of leprosy in this city. The literature of this subject is, considering the rarity of the disease, pretty extensive, especially as regards the pathological anatomy, and the histological changes occurring during its progress. To those who wish to refer to this literature I may say that the last paper of Dr. H. D. Schmidt, of New Orleans, published in the *Chicago Medical Journal and Examiner*, April, 1882, gives all necessary points on this subject.

It is not the object of this paper to enter into details of the pathological anatomy of lepra, especially as Dr. Schmidt has lately given such an exhaustive and exact description of it (*vide* ARCHIVES OF MEDICINE, Dec., 1881), with which, on the whole, I can fully concur.

The first author who called attention to the fact that rod-like organisms can be found in leprous tissue, blood, pus, etc., and that they bear a direct relation to the disease,

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was Hansen. After him, Klebs and others have published similar results from their investigations of leprosy. These papers have not attracted the attention they deserve, as we find no mention of them even in the newest editions of our hand-books on skin diseases.

The discoveries of Weigert, Koch, Ehrlich, and others, regarding the use of aniline colors in examinations for bacteria enabled Neisser to make use of their methods in his investigations on the pathogenesis of leprosy, and the results of his researches have established, beyond doubt, the existence of bacillus lepræ. Not only was he able to detect and demonstrate the bacillus in all his cases, but also to cultivate them in blood serum and other fluids (*vide Virchow's Archiv*, June, 1881).

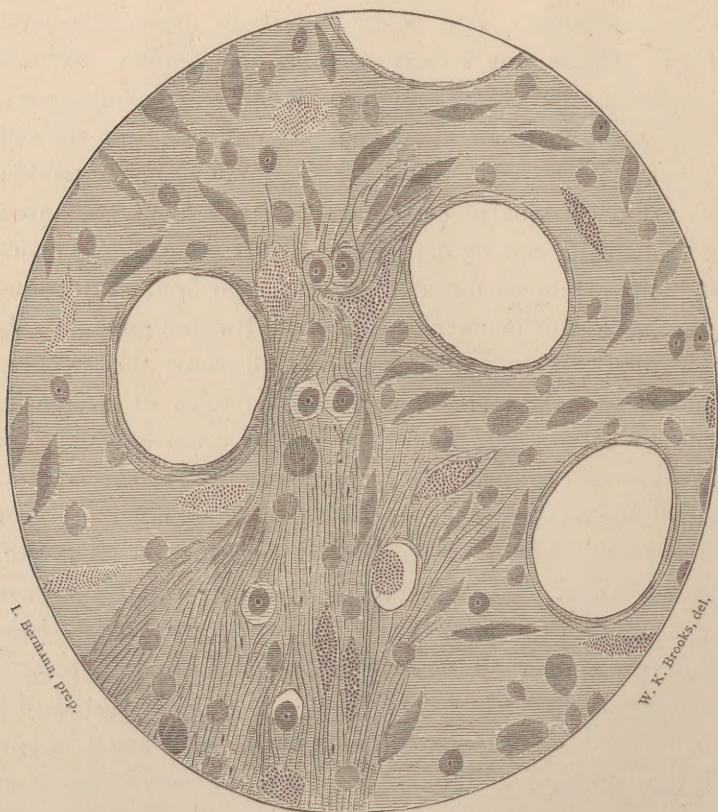
Dr. Atkinson and I took the piece of leprous tissue, submitted to my examination, from the lobe of the ear of the now living patient. It was hardened partly in Müller's fluid, partly in alcohol.

The sections were made after my dry-cutting method, and transferred first to turpentine, and then to absolute alcohol, in which they were kept constantly. After employing the usual methods of staining, without satisfactory results, I finally got a glimpse of the bacillus in the specimens by following the procedure described by Neisser in the aforementioned paper, and that of Weigert in the May number of the same journal. Neisser recommends that the sections be treated first with liq. potassæ (1:12), which, according to him, shows the bacilli without staining; but better results are achieved by using gentiana, methyl violet, or fuchsine, a one-per-cent. solution of these coloring agents being employed. The sections are subsequently washed in acidulated alcohol. Neisser expressly stated, however, that bacillus lepræ stains with more difficulty than any other bacteria; he likewise recommends an acid eosin-

hämatoxylin solution as especially effective for the demonstration of the bacillus lepræ.

I have been able to verify Neisser's results by these methods, but have derived more satisfaction by following the plan recommended by Weigert, which is to transfer the section from distilled water into a one-per-cent. solution of aniline blue or purple (the aniline blue which I used comes from Vogler, Son, & Co., of Baltimore) for a few seconds, and then washing it in distilled water. It is then transferred to absolute alcohol, which takes a large part of the color out again. This alcohol must be changed several times. The section is next placed in oil of cloves. By putting the section alternately into alcohol and oil of cloves, the coloring matter is almost entirely removed from the cell protoplasm, so that only the bacilli contained in the section are stained bright blue or purple. It is finally mounted in Canada balsam or damar varnish, after having remained in oil of cloves for about twenty-four hours. Sections prepared in this manner, and examined with a good $\frac{1}{8}$ or $\frac{1}{10}$ objective system and condenser, will show the bacillus most perfectly. The superior advantages of Weigert's method became apparent immediately upon examination. The groups of large cells, which constitute the special feature of leprous tubercles, appear to have retained more of the staining fluid upon superficial examination. On submitting them to a higher magnifying power, it becomes apparent that the intensity of color is due to the presence of deeply pigmented rods within the cells, and not simply to the staining of nuclei. The size of these rods equals $\frac{1}{8}$ to $\frac{1}{5}$ the size of a red blood corpuscle in breadth, and $\frac{1}{2}$ to $\frac{1}{3}$ in length. Almost without exception they are found most perfectly within the large "lepra cells" (Virchow), and irregularly distributed through them. These cells are usually four to eight times the size of a white blood cor-

puscle, and are lying close together with but little interstitial tissue. If the specimen is stained double, with eosin and violet, there will also be found distributed among the larger cells mentioned a few cells resembling the Waldeyer's plasma cells, *which stain intensely red with eosin, do not take the violet staining, and never contain bacilli*. The larger cells contain frequently several nuclei. Very often I find very deeply stained large cells, which on close examination prove to be filled almost entirely with bacilli of different sizes.¹



Section from leprosy tissue showing rod-shaped bacteria—*Bacillus lepræ*.

¹ As a curious coincidence I should mention that in some of the lymphatic vessels I find networks of fibrinoid substance containing at the same time bacilli. The same observation can be made in the lymphatics in syphilitic tissue, and in tuberculous tissue.

These large cell conglomerations I always find immediately beneath the rete Malpighii, and, cannot discover among them any blood-vessels. On that account I should consider them as tubercles, with highly developed cells about to undergo a rapid disintegration for want of proper nourishment.

The *Annales de Dermatologie et de Syphiligraphie*, October 25, 1881, contain a paper by Cornil and Suchard on the same subject, with very excellent plates, so that it seems almost unnecessary to add a plate to this paper, except that the one drawn for me by Prof. W. K. Brooks, of the Johns Hopkins University, is a correct copy of one of my sections.

In conclusion I wish to call attention to the fact that only a very strict observation of the rules given will enable investigators to achieve satisfactory results, and that, even in spite of most careful manipulation, specimens are liable to fade within 24 hours of their preparation.

Since the above was written I have found that by staining the specimens first either in a 1% eosin or Bismarck solution, before staining with the aniline blue, still better results can be obtained.

In the April number of the *Chicago Medical Journal and Examiner*, Dr. H. D. Schmidt, of N. O., discusses the question whether the bacillus lepræ is a reality or a fiction. That he has not succeeded in finding them in his specimens I cannot doubt, since it was testified that they could not be seen in them by microscopists in Chicago. I am satisfied that some fault in his method is alone the cause of his non-success, and I should be very glad to stain some of his material if he will send it to me, and believe that I could convince him, in this way, of the unfictional character of the bacillus lepræ.

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